Pilgrim Will Close By June 1, 2019

Implications

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Pilgrim Watch
Town of Duxbury Nuclear Advisory Committee
January 2016

Entergy announced Pilgrim will shut

Why? Pilgrim is losing $40 million a year - It cannot compete with cheaper sources electricity-mainly natural gas

It may close sooner: Announcement will be made 2016 whether to refuel in 2017

SAFETY ISSUES – WHETHER OPERATING OR CLOSED

CONTINUED OPERATION

Safety Issues

You can't safely run an antique reactor

Pilgrim is ranked in NRC's Lowest safety category

Will Entergy, a company losing money, make investments needed to repair and maintain its 44 year-old reactor to assure our safety and rise out of NRC's lowest safety rating during the remaining period before shutdown? **Unlikely**

Will NRC require Entergy to make the necessary investments

DECOMMISSIONING

What is Decommissioning?

The NRC's definition – Title 10 of the Code of Federal Regulations, Section 50.2 (10 CFR 50.2):

"The safe removal of a facility from service and reduction of residual radioactivity to a level that permits termination of the NRC license."

Rule restricts use DTF to "reduction residual radioactivity" until after decommissioning completed– but, NRC is granting exemptions

NRC Has Three Decommissioning Options

1. **Decontamination** (DECON)

   Structures and components contaminated with radioactivity are either cleaned, or removed and shipped to a licensed radioactive dump site

2. **Safe Storage (**SAFSTOR)

   The facility is placed in nuclear limbo for up to 60 years for later decontamination

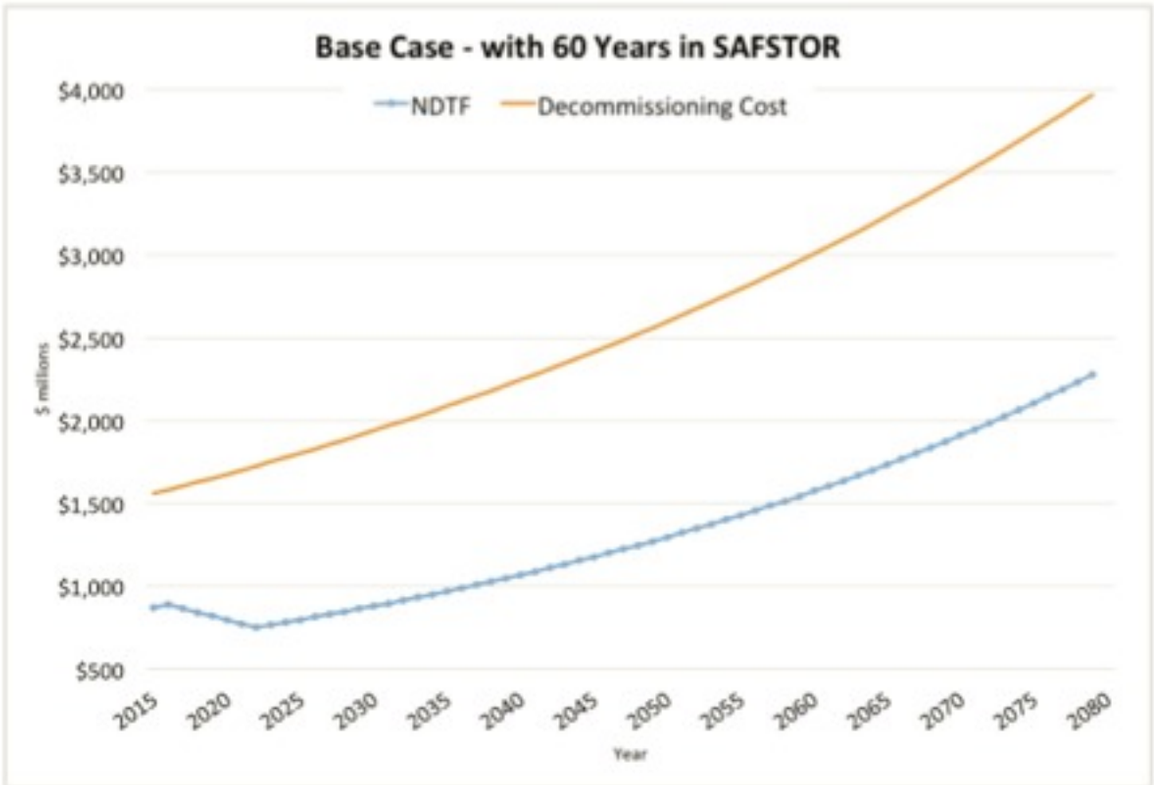
3. **Entombment** (ENTOMB)

   The facility is basically covered over in cement and left forever.

Pilgrim will choose SAFSTOR – Insufficient Funds for DECON

- Pilgrim's Decommissioning Trust Fund (DTF) has **$896.42 million** (12/31/14)
  - Entergy estimated that it would cost **$1.243** billion to decommission Vermont Yankee (VY) – VY is smaller than Pilgrim.
  - Entergy's Pilgrim DTF now contains at least **$346.58 million**, and **perhaps billions, less than will be needed**
- NRC hopes DTF investments will grow more than increased decommissioning costs, but…
  - NRC estimates DTF will grow at 2% above inflation
  - Other estimates of DECON cost growth rates range from 3.0% to 6.2% above inflation

Decommissioning Trust Fund Investments



Assumptions: NRC's 2% investment growth; 1.5% (rather than 3%-6%) growth in decommissioning costs; and this does not factor in Entergy dipping into the DTF for purposes other than radiological decommissioning.

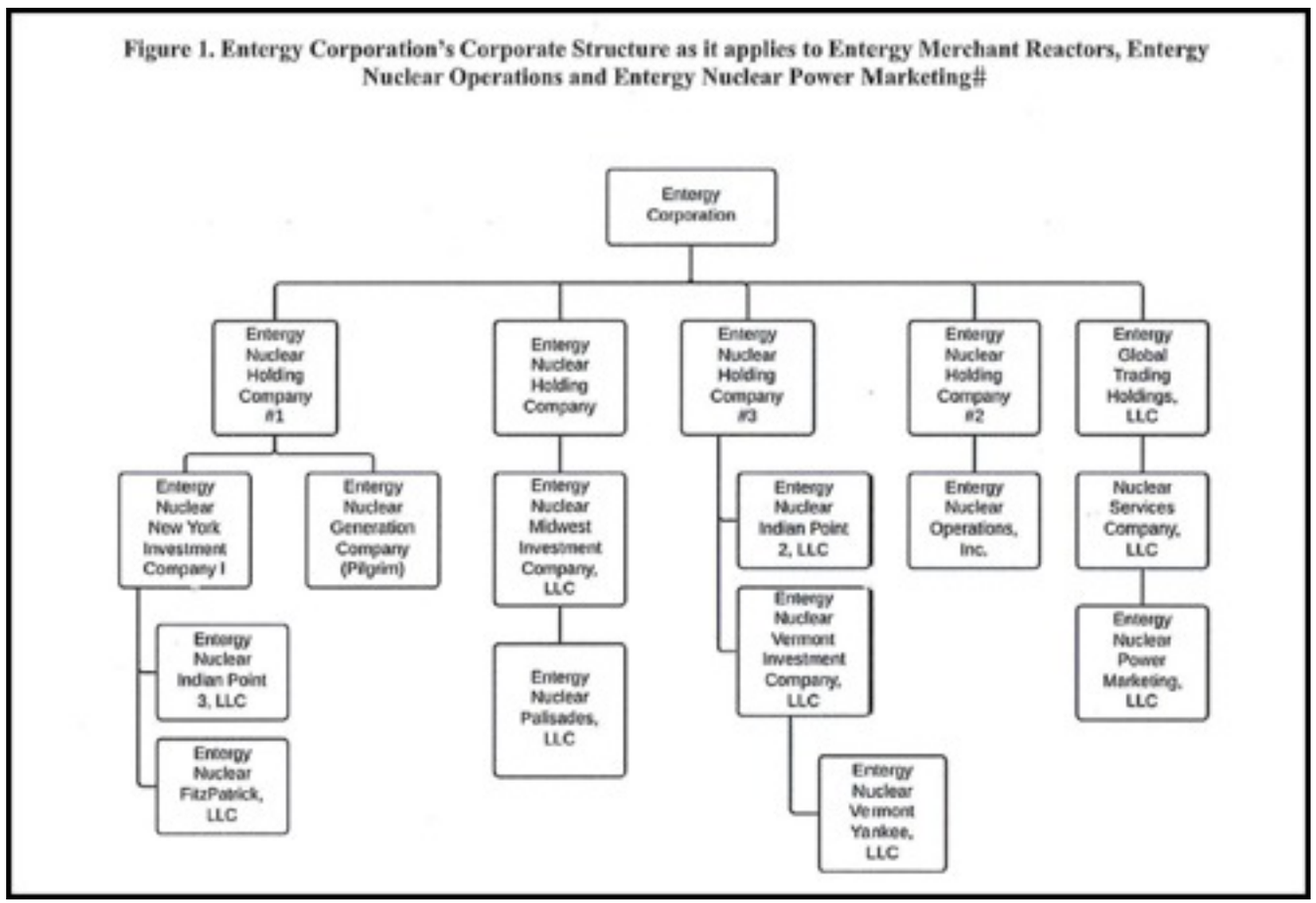
Entergy wants to use the DTF for purposes other than radiological

NRC rules require DTF funds to be used only for radiological decommissioning – to ensure sufficient funds available for dismantlement and cleanup.

Entergy has filed a number of separate requests to NRC for permission to use VY's $665 million DTF for purposes other than radiological decommissioning.

- Spent fuel Management Costs – Vermont $225 million (NRC Approved)
- Property Taxes – $1.2 million
- Emergency Planning & Insurance – $5.4 million
- Legal & Lobbying fees

Pilgrim is a Limited Liability Company (LLC) Who will pay when



PROTECT OUR WALLETS – SUPPORT S. 1798 An Act establishing funding for postclosure activities

Requires Pilgrim, and any other commercial nuclear reactor in the Commonwealth, to pay an **annual $25,000,000 post-closure funding fee** – to help insure that taxpayers won't have to pay.

- The fee will be placed in a trust fund in the office of the State Treasurer.
- After Pilgrim, or any other commercial nuclear reactor in the Commonwealth, has been completely decommissioned, any excess in the fund will be returned to the plant owner, with interest.

Status: Bill has not been reported out of the Joint

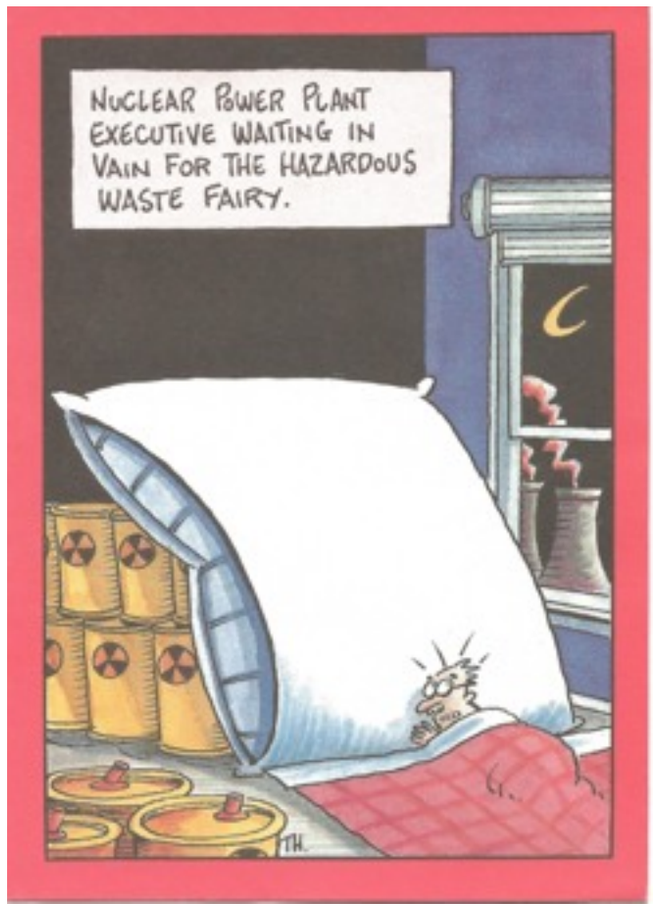
SAFSTOR
Impacts of Delayed

- Delays economically productive use of site
- Property values nearby remain depressed
- Contamination onsite will not be identified and cleaned up – providing opportunity for contamination to spread – both on and offsite
- Workers with specific knowledge of spills and other specific problems will have retired – reducing likely effective cleanup
- Offsite emergency planning will be eliminated after operations cease – placing unfunded burden on state and local communities

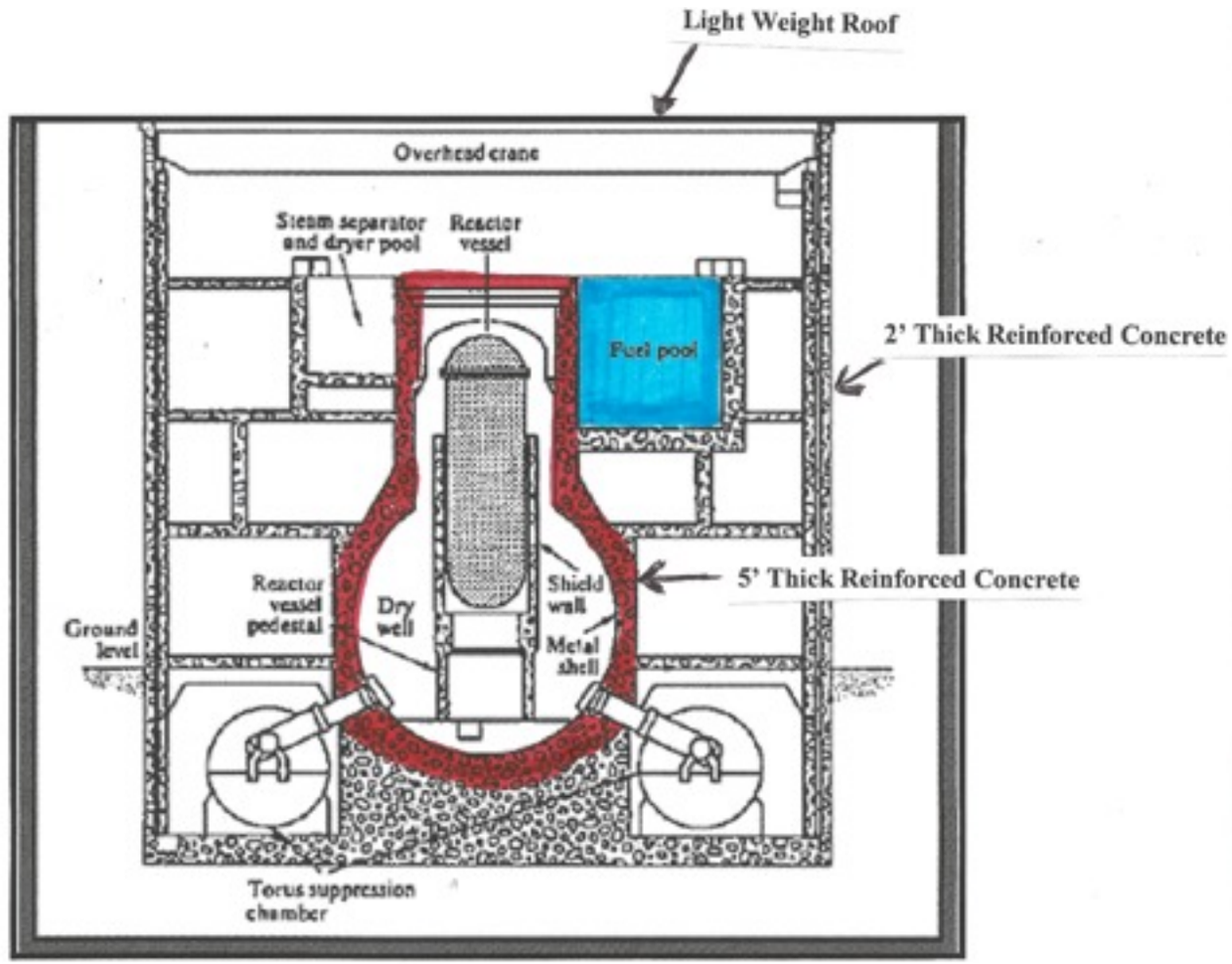
NOW AND IN THE FUTURE

Spent Fuel Storage

SPENT FUEL- No Forwarding Address



PILGRIM'S SPENT FUEL POOL



Pilgrim's Spent Fuel Pool
The Problem

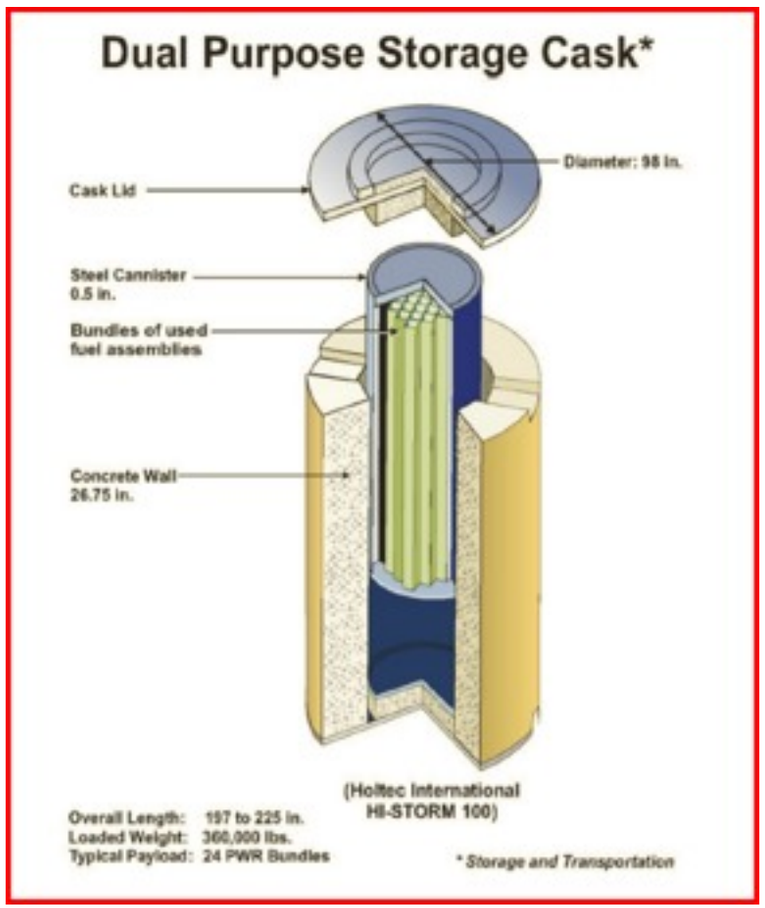
- **Location**: Pilgrim's pool is located in the upper floor of the reactor, outside primary containment with a thin and vulnerable roof overhead.
- **Crowded**: Pilgrim's pool was designed to held 880 used fuel assemblies; it now holds 3,279
- **Fire:** If pool loses water simply to the top of the assemblies, a pool fire can occur releasing radiation
- **Consequences**: Up to $488 billion in damages, 24,000 latent cancers, contaminate hundreds of miles

NRC's NUCLEAR WASTE RULES ALLOW

- Spent fuel can stay in either the pool or in dry casks for 60 years

- During the subsequent 300 years, spent fuel assemblies may be kept in dry casks onsite – changing pad and casks every 100 years

DRY CASK STORAGE- SAFER SOLUTION



Dry Casks

DRY CASK STORAGE

- Fuel cooled in the spent fuel pool for > 5 years after being taken out of the reactor can go into dry casks
- Each cask can hold 68 spent fuel assemblies
- Each cask weighs 392,281 lbs. when placed on pad
- Casks cost about $2 million each
- Existing storage pad can hold 40 casks. Entergy will need an additional pad to empty the pool
- 2015 –(3) casks on pad – 2016 (5) more

DRY CASK STORAGE SAFETY ISSUES

Dry cask storage is far safer than pool storage, but there are problems … and the casks likely will remain onsite for decades

According to the Nuclear Regulatory Commission (NRC)

- The thin (0.5”) stainless steel canisters may crack within 30 years.
- No current technology exists to inspect, repair or replace cracked canisters.
- With limited monitoring, we will only know after they leak radiation.

Security – Pilgrim's Plan "Candlepin Bowling for Terrorists"

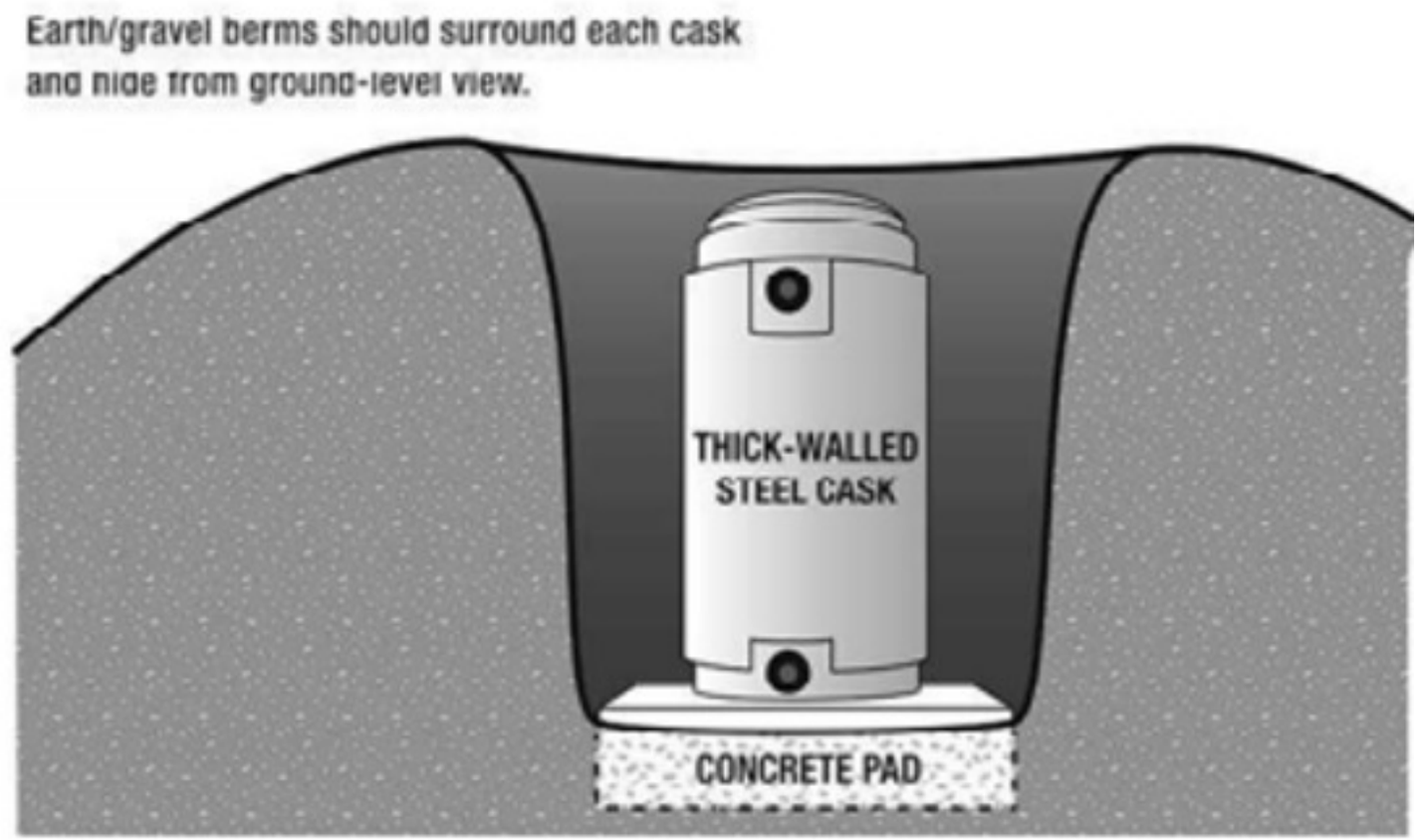
WEAPONS AVAILABLE TODAY
Cask Shell Canister = 0.5" (1.3 cm)
Cask Concrete Wall = 26.75" (68 cm)

Table IV-2
The Shaped Charge as a Potential Instrument of Attack

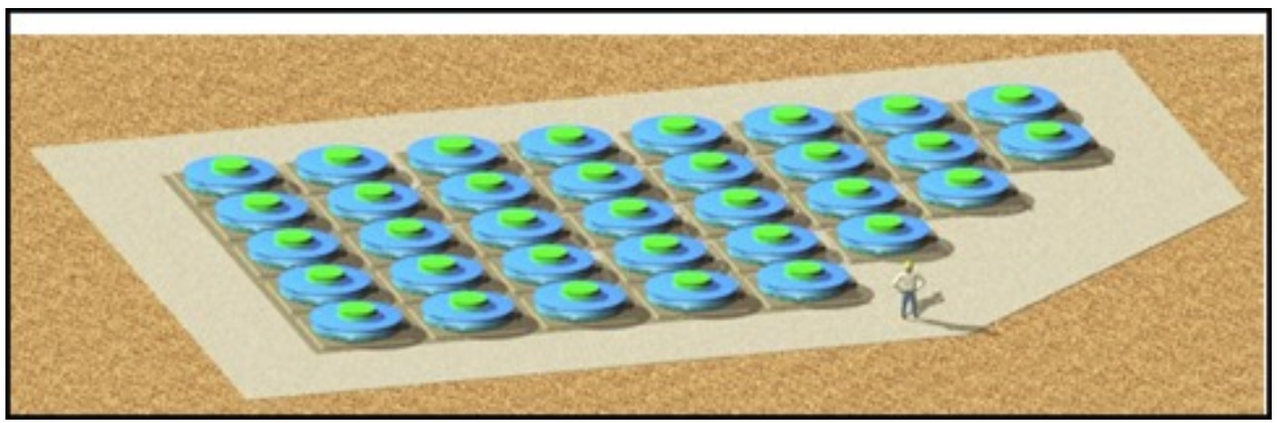
Category of Information	Selected Information in Category
General information	• Shaped charges have many civilian and military applications, and have been used for decades • Applications include human-carried demolition charges or warheads for anti-tank missiles • Construction and use does not require assistance from a government or access to classified information
Use in World War II	• The German MISTEL, designed to be carried in the nose of an un-manned bomber aircraft, is the largest known shaped charge • Japan used a smaller version of this device, the SAKURA bomb, for kamikaze attacks against US warships
A large, contemporary device	• Developed by a US government laboratory for mounting in the nose of a cruise missile • Described in detail in an unclassified, published report (citation is voluntarily withheld here) • Purpose is to penetrate large thicknesses of rock or concrete as the first stage of a "tandem" warhead • Configuration is a cylinder with a diameter of 71 cm and a length of 72 cm • When tested in November 2002, created a hole of 25 cm diameter in tuff rock to a depth of 5.9 m • Device has a mass of 410 kg; would be within the payload capacity of many general-aviation aircraft
A potential delivery vehicle	• A Beechcraft King Air 90 general-aviation aircraft can carry a payload of up to 990 kg at a speed of up to 460 km/hr • The price of a used, operational King Air 90 in the USA can be as low as $0.4 million

Source:

Solution: Safer Dispersed/Hardened Dry Cask Storage- Literally, Dirt



Alternate Security Solutions
Place Casks in Reinforced Concrete Building; Use



Dry Cask Storage Pad – Located Close To Bay

Pad Located Close To Reactor Building
Will it interfere with dismantling reactor

POST OPERATIONS

Will the lights stay on after Pilgrim shuts?

- **The lights stayed on when Pilgrim was offline for 49 days during winter and spring 2015.**
  - During winter storm Juno, despite the fact that Pilgrim was off line for eleven days;
  - Pilgrim was offline during February storm Neptune for three days;
  - During Pilgrim's Spring 2015 refueling the outage that lasted 35 days.
- **Natural gas and wind power** dominate the new energy proposals in the ISO-NE queue.
- ISO's forecast for 2018-2023 shows that electric usage and peak demand will grow slowly

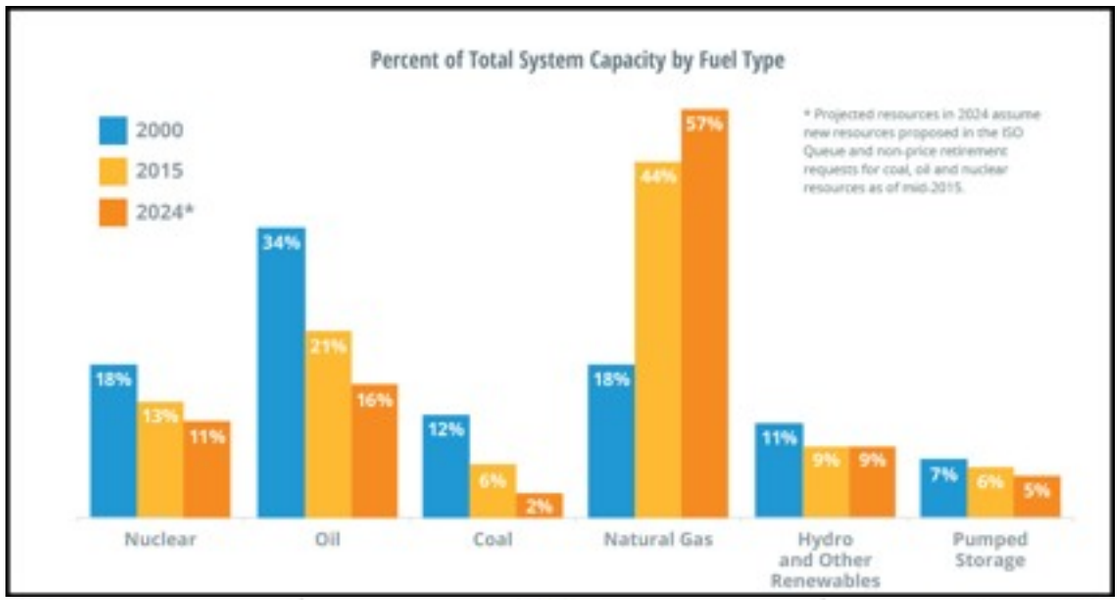
Impact On State's Carbon Reduction Goals?

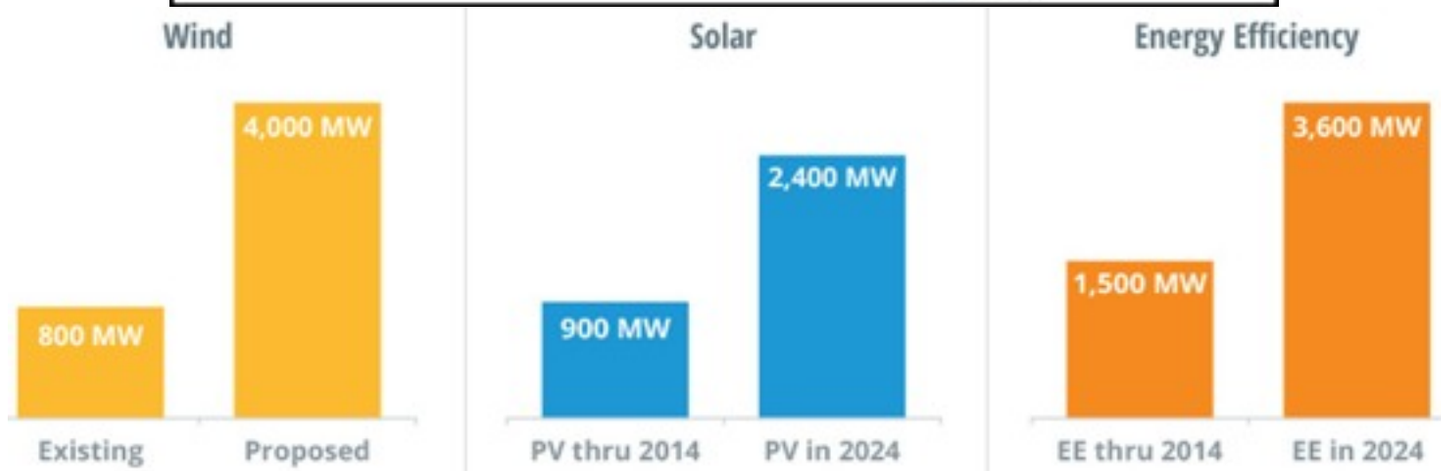
Massachusetts Can Meet Its Carbon Reduction Goals Without Pilgrim

According to the Union of Concerned Scientists:

- Projected wind power in this region = 2,000 megawatts
- Projected imported hydro power = 2,000 megawatts

Percent total capacity by fuel type ISO-NE





DUXBURY 2016 TOWN MEETING ARTICLE

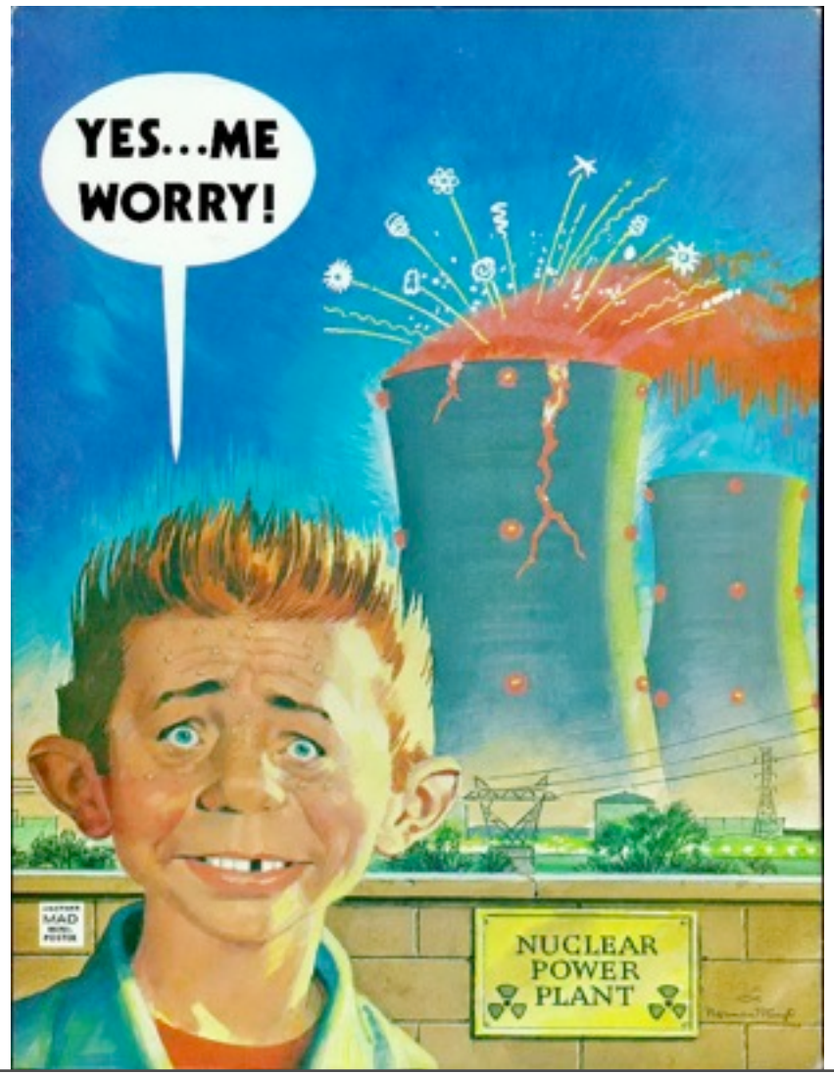
DUXBURY 2016 TOWN MEETING

- Entergy, the licensee, shall pay for the decommissioning process in full, not the Commonwealth's taxpayers.
- Decommissioning shall occur as soon as possible following closure; instead of deferring dismantlement and cleanup for decades.
- The spent nuclear fuel assemblies shall be moved out of the pool and into hardened, onsite storage as soon as possible.
- Offsite emergency planning shall be retained until the spent fuel pool is emptied; and Entergy shall continue to provide funding.
- The Massachusetts Department of Public Health shall continue and expand its offsite radiological monitoring, including its real-time air monitoring program, offsite environmental sampling and onsite tritium monitoring; and Entergy shall continue to provide funding.

DUXBURY 2016 TOWN MEETING

- The skilled workforce that is knowledgeable and experienced with Pilgrim shall be retained for planning and implementation of shutdown and cleanup.
- The site shall be returned to "greenfield" for unrestricted use; radioactivity and chemical contamination shall be cleaned up.
- Establish a Council on Decommissioning. It will be involved in the oversight of the decommissioning process with representatives from: pertinent State Government agencies; elected officials from Plymouth and Barnstable Counties; and citizen groups from Duxbury and all other impacted communities. It will hold open public meetings.

Conclude…



TO LEARN MORE

DECOMMISSIONING FORUM, March 23, 6:30 – Plymouth Library

Links

- Nuclear Regulatory Commission http://www.nrc.gov/
- Union Concerned Scientists http://www.ucsusa.org
- Nuclear Information Service http://www.nirs.org
- Beyond Nuclear http://www.beyondnuclear.org
- Fairewinds Energy Education http://www.fairewinds.org/
- Safe & Green Campaign http://www.safeandgreencampaign.org/resources/decomissioning-resources